

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Issued October 7, 1907.

United States Department of Agriculture,

FOREST SERVICE.

GIFFORD PINCHOT, Forester.

SILVICAL LEAFLET 6.

SITKA SPRUCE.

Picea sitchensis (Bong.) Trautv. and Mayer.

Sitka spruce is the largest of all spruces and is of great commercial importance on the northern Pacific coast, where it is generally marketed under the name of spruce. Its light, weak, soft, and straight-grained lumber is used for interior finishing, shipbuilding, cooperage, and packing cases. It is also beginning to be used for wood pulp, and this use will greatly increase in the future. The economic importance of the tree, coupled with its rapid growth and its occurrence in dense, easily accessible stands, points to the desirability of forest management.

RANGE AND OCCURRENCE.

Sitka spruce occurs in the forests of the Pacific coast from Casper, Mendocino County, Cal., northward through Oregon, Washington, British Columbia, and Alaska to the base of the Alaska Peninsula. It confines itself chiefly to the vicinity of the coast and extends nowhere far inland in its entire range of over 1,300 miles from California to Alaska. Where it extends inland at all it does so only along arms of the ocean and along the courses of streams. It ranges farthest inland in the country east of and adjacent to Puget Sound. Here it extends to the western base of the Cascade Mountains and ascends, in favorable situations, to an elevation of over 3,000 feet above the sea. Otherwise it confines itself chiefly to the country between the coast and the western slope of the Coast Ranges. It is common on the islands of British Columbia and Alaska along the

coast. In Alaska it extends farther north and west than any other Pacific coast forest tree.

Sitka spruce confines itself chiefly to low elevations. Its altitudinal range is chiefly governed by soil, atmospheric, and moisture conditions. It extends from sea level to elevations of 5,000 feet in extreme cases in parts of Alaska. Usually it confines itself to elevations below 3,000 feet. It ascends to higher elevations in British Columbia and Alaska than farther south in Washington, Oregon, and California. This is contrary to the common habit of other species in that region, which descend to lower elevations in their extension northward.

CLIMATE.

The climatic conditions within the range of Sitka spruce favor forest growth. The climate is generally mild and uniform, being ameliorated by the influence of the Pacific Ocean and the warm Japanese current. The precipitation is heavy, the air is humid, dense fogs are frequent, changes of temperature are gradual, with mild summers, and winters not severe.

Nevertheless the average daily, monthly, and yearly range of temperature and the average annual precipitation and the humidity vary considerably between its southern limit in California to its northern limit in Alaska and from the coast to elevations of 3,000 to 5,000 feet above the sea. The precipitation varies from about 20 inches in California to over 100 inches in Alaska. The temperature drops likewise to 35° F. below zero toward its northern limit in the vicinity of Cook Inlet in Alaska. Over a great part of its distribution, however, especially toward its southern limit and along the coast, it freezes but lightly and the thermometer seldom drops to zero.

HABIT.

The seedling of Sitka spruce is small and delicate. Later it assumes a vigorous height growth and overtakes less rapid growing species. With its leader exposed to light, it forms a pyramidal crown. The branches are horizontal, becoming pendant with age, and the foliage is persistent from 2½ to 6½ years. The stem tapers rapidly for a spruce and is sometimes swollen or buttressed at the base. The tree is branchy and the crown ordinarily extends two-thirds down the stem.

The root system is spreading and shallow. In moist situations the roots run close to the surface of the soil under the cover of moss, duff, and other débris. In drier situations the roots enter the ground more deeply, and a deeper and more porous soil becomes desirable.

Sitka spruce reaches, under favorable conditions, a height of 200 feet and a diameter of from 10 to 15 feet, proportions not attained by any other spruce, though it is usually smaller, averaging from 3 to 4 feet in diameter and about 100 feet in height. At high elevations and toward its northern limit in Alaska it becomes scrubby and branchy.

The wood is light, straight-grained, with white sapwood and light-brown hardwood. It is largely used in interior finishing, fencing, boat building, cooperage, packing cases, and for pulp.

ASSOCIATED SPECIES.

Sitka spruce is gregarious and where soil, moisture, and competing species permit forms pure stands of considerable density, especially toward its northern limit. It may associate with redwood, western hemlock, giant arborvitæ, lowland fir, yellow cedar, California yew, black hemlock, and, of the hardwoods, with alder, maple, and cottonwood. Western hemlock is its most common associate. Sitka spruce and western hemlock are the chief components of the forest in Alaska, where in their competition for the soil sometimes one and sometimes the other is dominant. In general, the spruce dominates near the coast, while the hemlock asserts itself inland and at higher elevations.

SOIL AND MOISTURE.

Sitka spruce occurs generally in moist situations along the coast on alluvial and sandy bottomland, along courses of streams, and also on moist slopes facing the sea. In parts of British Columbia, Alaska, and the islands along the coast Sitka spruce thrives on very thin and light soils where there is an abundance of atmospheric and soil moisture. It follows the moist soils in its extension eastward and on mountain slopes. For its best development it requires constant soil moisture, a humid air, and good soil. In situations deficient in moisture the Sitka spruce is more or less stunted, and the quantity and quality of soil become more important as the moisture supply decreases.

It can endure inundation along the flood plains of the coast, but generally grows a short distance from the water's edge to avoid too wet situations.

TOLERANCE.

Sitka spruce is a tolerant species, but less so than giant arborvitæ and hemlock. It endures dense shade in its seedling stages, when it competes successfully with young growth of hemlock. It can endure considerable side shade in later life. Overhead light, however, is necessary for its development after the seedling stages. It makes a

rapid height growth after the first few years and overtakes the slower growing hemlock. It forms and maintains alone or in association with other species a dense stand. Seedlings or individuals permanently overtopped remain stunted and grow but little; and if the shade is dense and persistent they eventually die out.

REPRODUCTION.

Sitka spruce reproduces itself freely under favorable conditions within its range. The cones are produced at the upper part of the crown. The seeds are winged and are readily scattered by the wind; they mature and are disseminated the same season. The seedlings thrive on wet soil, on muck, moss, duff, or decaying wood; they are sensitive to frost the first few years, but not in later life.

MANAGEMENT.

The chief need of Sitka spruce is moisture in the soil and in the air. It is further characterized by its shallow root system, its tolerance in early youth, its demand for overhead light in later life, its slow initial growth followed by a very rapid height growth, and its power to endure considerable inundation; by its demand of wet situations for satisfactory reproduction, its power to reproduce and thrive on the sandy shallow soils along the coast, its habit of forming dense pure stands, and by the dissemination of its seeds by the wind.

From these silvical characteristics Sitka spruce is well adapted to pure forests under favorable moisture conditions and also to mixed stands in association with tolerant and slower growing species, such as hemlock. Clear cutting in narrow strips would probably insure ready restocking of spruce or spruce and hemlock. In a mixed reproduction of spruce, hemlock, and other slow-growing species the spruce would be able to live at first in the shade of the other species and would later overtake them by its sudden and rapid height growth, while the slow-growing tolerant hemlock would be content with its subordinate position, and the spruce would aid much in clearing the rather persistent side branches of the hemlock.

[Leaf. 6]